

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT



To:

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NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(PCT Rule 71.1)

Date of mailing
(day/month/year)

04.05.2006

Applicant's or agent's file reference
CHIYODA26WO

IMPORTANT NOTIFICATION

International application No.
PCT/JP2004/018691

International filing date (day/month/year)
08.12.2004

Priority date (day/month/year)
18.12.2003

Applicant
CHIYODA CORPORATION et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference CHIYODA26WO		FOR FURTHER ACTION		See Form PCT/PEA416
International application No. PCT/JP2004/018691		International filing date (day/month/year) 08.12.2004	Priority date (day/month/year) 18.12.2003	
International Patent Classification (IPC) or national classification and IPC INV. B01J35/04 B01J23/46 B01J23/58 B01J23/63 C01B3/00				
Applicant CHIYODA CORPORATION et al.				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 3 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand 14.10.2005		Date of completion of this report 04.05.2006		
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized officer de Cauwer, R Telephone No. +49 89 2399-7344 		

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**International application No.
PCT/JP2004/018691**Box No. I Basis of the report**

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-35 as originally filed

Claims, Numbers

18, 19 as originally filed

1-17 received on 05.12.2005 with letter of 01.12.2005

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-19
	No: Claims	
Inventive step (IS)	Yes: Claims	1-19
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-19
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

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Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:
 - D1: WO 95/35152 A (ENGELHARD CORPORATION) 28 December 1995
 - D2: US-A-5 490 977 (WAN ET AL) 13 February 1996
 - D3: US-A-5 989 507 (SUNG ET AL) 23 November 1999
 - D4: US-A-5 898 014 (WE ET AL) 27 April 1999
 - DO: EP-A-0 885 650 (DEGUSSA-HUELS AKTIENGESELLSCHAFT; DEGUSSA AKTIENGESELLSCHAFT; UMICORE) 23 December 1998
 - D6: US 2003/125202 A1 (RUWISCH LUTZ MARC ET AL) 3 July 2003
 - D7: US-A-5 597 771 (HU ET AL) 28 January 1997
 - D8: US 2003/177763 A1 (TWIGG MARTYN VINCENT ET AL) 25 September 2003
 - D9: US-A-5 130 109 (WAN ET AL) 14 July 1992
 - D10: EP-A-1 004 347 (DMC2 DEGUSSA METALS CATALYSTS CERDEC AG; DEGUSSA-HUELS AKTIENGESELLSCH) 31 May 2000
 - D11: US-A-4 294 726 (BOZON ET AL) 13 October 1981
 - D12: WO 01/36323 A (CONOCO INC) 25 May 2001

2. The document D1 - D11 are no longer regarded as being the closest prior art to the subject-matter of claim 1 (and 16) since they do not disclose the specific molar ratios of second and third to first ingredient. Moreover, they are concerned with a different purpose for the catalyst, namely TWC.

3. The document D12 is thus regarded as being the closest prior art to the subject-matter of claim 1 (and 16) . It is directed at a catalyst for the production of synthesis gas.
 The subject-matter of claim 1 (and 16) differs from the one in D12 in that the second ingredient of the catalyst composition is not present. Furthermore, the specific molar ratios of second and third to first ingredient are not disclosed either.

 The subject-matter of claim 1 and 16 is therefore new (Article 33(2) PCT).

3. The problem to be solved by the present invention may be regarded as the

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provision of an alternative catalyst for the manufacture of synthesis gas by direct catalytic partial oxidation.

The solution to this problem proposed in claim 1 (and 16) of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

From the comparative examples it is clear that the catalysts of the present invention achieve better results (see table 1).

4. Claims 3-15 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

CLAIMS

1. (Amended) A catalyst for manufacturing
synthesis gas containing carbon monoxide and hydrogen
5 as principal ingredients from feedstock gas
containing hydrocarbon having 1 to 5 carbon atoms in
each molecule and oxygen, characterized in that
the catalyst for manufacturing synthesis gas
has a carrier and a Group VIII metal carried by the
10 carrier;

said carrier containing a first ingredient, a
second ingredient and a third ingredient;

said first ingredient being an oxide of at
least an alkaline earth metal selected from the group
15 of magnesium, calcium, strontium and barium;

said second ingredient being an oxide of at
least an element selected from the group of scandium,
yttrium and lanthanoids;

said third ingredient being zirconia or a
20 substance containing zirconia as principal ingredient
and having a solid electrolytic property,

wherein the molar ratio of said second
ingredient relative to said first ingredient is
between 0.02 and 0.40 and the molar ratio of said
25 third ingredient relative to said first ingredient is
between 0.04 and 1.5.

2. (Canceled)

substance selected from ceramic foam and ceramic honeycomb.

10. The catalyst according to claim 9, wherein said porous body is made of ceramic foam and
5 has a mesh structure of 10 to 40 cells per inch.

11. The catalyst according to claim 9, wherein said porous body is made of ceramic honeycomb and has a structure of 100 to 400 cells per square inch.

10 12. The catalyst according to claim 1, wherein said Group VIII metal is at least a metal selected from the group of rhodium, platinum, palladium, ruthenium and iridium.

13. The catalyst according to claim 12,
15 wherein

said Group VIII metal is rhodium.

14. The catalyst according to claim 1, wherein said Group VIII metal is carried by the carrier at a rate of 100 to 50,000 weight ppm per unit weight
20 of the carrier.

15. The catalyst according to claim 1, wherein said Group VIII metal is carried by the carrier at a rate of 2×10^{-7} to 5×10^{-3} mol/m² per unit surface area of the carrier.

25 16. (Amended) A method of manufacturing synthesis gas containing carbon monoxide and hydrogen as principal ingredients by causing feedstock gas

containing hydrocarbon having 1 to 5 carbon atoms in each molecule and oxygen to contact a catalyst for manufacturing synthesis gas, characterized in that

said catalyst for manufacturing synthesis gas
5 has a carrier and a Group VIII metal carried by the carrier;

said carrier containing a first ingredient, a second ingredient and a third ingredient;

said first ingredient being an oxide of at
10 least an alkaline earth metal selected from the group of magnesium, calcium, strontium and barium;

said second ingredient being an oxide of at least an element selected from the group of scandium, yttrium and lanthanoids;

15 said third ingredient being zirconia or a substance containing zirconia as principal ingredient and having a solid electrolytic property,

wherein the molar ratio of said second ingredient relative to said first ingredient is
20 between 0.02 and 0.40 and the molar ratio of said third ingredient relative to said first ingredient is between 0.04 and 1.5.

17. (Canceled)

18. The method according to claim 16,
25 characterized in that,

when the molar number of carbon deriving from